Curriculum Vitae

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RESEARCH INTERESTS:

The primary motivation of my research is to increase the accuracy and interpretability of measured functional MRI signals. My current research is focused on understanding the dynamics of the blood oxygenation level dependent fMRI signal such that we can make more accurate statements about the underlying neuronal function. My previous research has focused on the development of new imaging strategies and the application of post-processing techniques to reduce artifacts resulting from task-induced subject motion. Advancements in these areas are essential for the improved application of fMRI to clinical studies and basic neuroscience research.

EDUCATION:

B.A. in Physics, University of California at Santa Cruz, June 1994.
Thesis: *X-ray Holography*
Minor: Mathematics

Ph.D. in Biophysics, Biophysics Research Institute, Medical College of Wisconsin, October 1999.
Dissertation Title: *Functional Magnetic Resonance Imaging in the Presence of Task-Induced Motion.*

RELEVANT EXPERIENCE

- Staff Scientist — *Apr. 2004 – present.*
  Unit on Functional Imaging Methods, Laboratory of Brain and Cognition, National Institute of Mental Health, NIH
- Intramural Research Training Award (IRTA) Post-doctoral Fellow — *Dec. 1999 – Apr. 2004.*
  Functional MRI Facility, Intramural Research Program, National Institute of Mental Health, NIH

OTHER EXPERIENCE

- Teaching Assistant, *Introduction to Physics I*, University of California at Santa Cruz, 1994.
- Lab Assistant, Introductory Physics Labs, University of California at Santa Cruz, 1991-1994.
  Maintaining physics teaching and laboratory apparatus,
  Setting up lecture demonstrations and teaching labs.
- Computer Skills
  UNIX/Linux, MS Windows, MS Access database programming, Mathcad, C programming,
  AFNI (fMRI data analysis package)

HONORS AND AWARDS

- Highest honors in major (Physics), University of California at Santa Cruz, 1994.
- College honors, University of California at Santa Cruz, 1994.
- Phi Beta Kappa, national honors society, 1994-present.
- Outstanding research poster presentation, 6th Annual Graduate Research Poster Sessions, Medical College of Wisconsin, 1997.
- Student Travel Stipend, International Society of Magnetic Resonance in Medicine, 1997, 1998, 1999.

MEMBERSHIP IN PROFESSIONAL SOCIETIES

- International Society of Magnetic Resonance in Medicine, 1994-present.
- Organization for Human Brain Mapping, 2001-present.

SKILLS

- Fluent in English and German

PUBLICATIONS

Papers:

1. F.Z. Yetkin, V. Haughton, R.W. Cox, J.S. Hyde, R.M. Birn, R. Prost, *The Effect of Motion Outside the FOV on FMRI*, AJNR 17, 1005-1009, 1996.

2. P.A. Bandettini, A. Jesmanowicz, J. Van Kylen, R.M. Birn, J.S. Hyde, *Functional MRI of Scanner Acoustic Noise Induced Brain Activation*, Magnetic Resonance in Medicine, 39 (3), 410-416, 1998.

3. R.M. Birn, P.A. Bandettini, R.W. Cox, A. Jesmanowicz, R. Shaker, *Magnetic Field Changes in the Human Brain Due to Swallowing or Speaking*, Magnetic Resonance in Medicine, 40,55-60, 1998.

4. M.K. Kern, R.M. Birn, S. Jaradeh, A. Jesmanowicz, R.W. Cox, J.S. Hyde, R. Shaker, *Identification and Characterization of Cerebral Cortical Reponse to Esophageal Mucosal Acid Exposure*, Gastroenterology, 115, 1353-1362, 1998.

5. R.M. Birn, P.A. Bandettini, R.W. Cox, R. Shaker, *Event-Related FMRI of Tasks Involving Brief Motion*, Human Brain Mapping 7(2), 106-114, 1999.

6. M. Marquart, R.M. Birn, V. Haughton, *Single- and multiple-event paradigms for identification of motor cortex activation*, American Journal of Neuroradiology, 21(1), 94-8, 2000.

7. M.K. Kern, R.M. Birn, S. Jaradeh, A. Jesmanowicz, R.W. Cox, J.S. Hyde, R. Shaker, *Swallow-related cerebral cortical activity maps are not specific to deglutition*, Am J Physiol Gastrointest Liver Physiol, 280(4), G531-538, 2001.

8. A.K Gosain, R.M. Birn, J.S. Hyde, *Localization of the Cortical Response to Smiling Using New Imaging Paradigms with Functional Magnetic Resonance Imaging*, Plastic and Reconstructive Surgery, 108, 1136-1144, 2001.

9. R.M. Birn, Z.S. Saad, P.A. Bandettini, *Spatial Heterogeneity of the Nonlinear Dynamics in the FMRI BOLD Response*, NeuroImage 14, 817-826, 2001.

10. R.M. Birn, R.W. Cox, P.A. Bandettini, *Detection Versus Estimation in Event-Related fMRI: Choosing the Optimal Stimulus Timing*, NeuroImage, 15, 252-264, 2002.

11. P.A. Bandettini, R.M. Birn, D. Kelley, Z.S. Saad, *Dynamic nonlinearities in BOLD contrast: neuronal or hemodynamic?*, International Congress Series, 1235, 73-85, 2002.

12. R.M. Birn, R.W. Cox, P.A. Bandettini, *Functional MRI Experimental Designs and Processing Strategies for Studying Brain Activation Associated with Overt Responses*, NeuroImage, 23, 1046-1058, 2004.

13. R.M. Birn, P.A. Bandettini, *The effect of stimulus duty cycle and "off" duration on BOLD response linearity*, NeuroImage (in press).

Book Chapters:

1. R.M. Birn, P.A. Bandettini, K. Donahue, *Magnetic Resonance Imaging: Principles, Pulse Sequences, and Functional Imaging*, Biomedical Uses of Radiation, Vol.1, Chapter 9. VCH-John Wiley and Sons, New York, 1999.

2. P.A. Bandettini, R.M. Birn, K.M. Donahue, *Functional MRI: Background, Methodology, Limits, and Implementation*, Handbook of Psychophysiology, 2nd ed., Chapter 36. Cambridge University Press, Cambridge, UK, 2000.

Abstracts Presented at National and International Meetings:

1. R.M. Birn, R. Shaker, A. Jesmanowicz, R.W. Cox, J.S. Hyde. *Magnetic Field Artifacts due to Swallowing in Functional Magnetic Resonance Imaging*, Gastroenterology, 112(4), A700 (1996).

2. R.M. Birn, F.Z. Yetkin, J.S. Hyde. *Artifacts in FMRI caused by Motion Outside the FOV*. In "Proceedings of ISMRM Second Annual Meeting, New York, 1996" p. 1770.

3. P.A. Bandettini, A. Jesmanowicz, J. Van Kylen, R.M. Birn, J.S. Hyde, *fMRI of Scanner Noise Induced Auditory Cortex Activation*, in "Proceedings of ISMRM Fifth Scientific Meeting, Vancouver, B.C., 1997," p. 349.

4. P.A. Bandettini, A. Jesmanowicz, R.M. Birn, J. Van Kylen, J.S. Hyde, *Combined Gradient-Echo and Asymmetric Spin-Echo (GREASE): Functional MRI Comparisons and Uses*, in "Proceedings of ISMRM Fifth Scientific Meeting, Vancouver, B.C., 1997," p. 1639.

5. R.M. Birn, A. Jesmanowicz, R.W. Cox, R. Shaker, *Correction of Dynamic B_z-field Artifacts in EPI*, in "Proceedings of ISMRM Fifth Scientific Meeting, Vancouver, B.C., 1997," p. 1913.

6. R.M. Birn, P.A. Bandettini, A. Jesmanowicz, R. Shaker, R.W. Cox, *Bz-field changes in the Human Brain due to Speaking and Swallowing*, in "Proceedings of ISMRM Fifth Scientific Meeting, Vancouver, B.C., 1997," p. 458.

7. R.M. Birn, A.K. Gosain, J.S. Hyde, *fMRI of Facial Muscle Movement Using a Single-Trial Paradigm*, in "Proceedings of ISMRM Sixth Scientific Meeting, Sydney, Australia, 1998," p. 1474.

8. R.M. Birn, R.W. Cox, *Improved Image Registration of Echo-Planar Images by Including Magnetic Field Correction*, in "Proceedings of ISMRM Sixth Scientific Meeting, Sydney, Australia, 1998," p. 716.

9. R.M. Birn, P.A. Bandettini, R.W. Cox, R. Shaker, *FMRI During Stimulus Correlated Motion and Overt Subject Responses Using a Single Trial Paradigm*, in "Proceedings of ISMRM Sixth Scientific Meeting, Sydney, Australia, 1998," p. 159.

10. R.M. Birn, P.A. Bandettini, J. Van Kylen, R.W. Cox, *Motion Decoupled FMRI: Event-Related Mapping During Overt Responses*, Human Brain Mapping, Montreal, 1998.

11. R.M. Birn, A.K. Gosain, J.S. Hyde, *Cortical Activity During Facial Muscle Movement Demonstrated by Functional MRI*, Plastic Surgery Research Council, 1998.

12. R.M. Birn, P.A. Bandettini, R.W. Cox, R. Shaker, *Improved Technique for Study of Brain Activity During Swallowing by Functional Magnetic Resonance Imaging (FMRI)*, "American Gastroenterology Association: Digestive Disease Week, 1998, Nr.3872.

13. R.M. Birn, B.D. Ward, R.W. Cox, *Functional MRI of Frequent Overt Word Production Using Random Inter-Stimulus Intervals*, ISMRM 7th Annual Meeting, Philadelphia, 1999, #784.

14. R.M. Birn, B.D. Ward, R.W. Cox, *FMRI During Overt Speech of Frequent Single Trials*, Human Brain Mapping, Duesseldorf, 1999.

15. R.M. Birn, Z.S. Saad, P.A. Bandettini, Spatial Distribution of the Nonlinearity of the BOLD Response, Human Brain Mapping, San Antonio, 2000.

16. R.M. Birn, J. Bodurka, P.A. Bandettini, *The efficacy of cardiac gating with variable TR correction in fMRI*, ISMRM 9th Scientific Meeting, Glasgow, 2001.

17. R.M. Birn, Z.S. Saad, P.A. Bandettini, *Linearity of the BOLD response to varying durations of stimulus "OFF" periods*, ISMRM 9th Scientific Meeting, Glasgow, 2001.

18. R.M. Birn, P.A. Bandettini, *Estimated BOLD impulse response depends on stimulus ON/OFF ratio*, Human Brain Mapping, Brighton, 2001.

19. R.M. Birn, H. Heekeren, S. Marrett, J. Bodurka, P.A. Bandettini, *Estimating Transient Neuronal Activity Dynamics using BOLD Contrast*, ISMRM 10th Scientific Meeting, Honolulu, 2002.

20. R.M. Birn, P.A. Bandettini, *The Effect of T2' Changes on Spin-Echo EPI-derived Brain Activation Maps*, ISMRM 10th Scientific Meeting, Honolulu, 2002.

21. R.M. Birn, J. Bodurka, P.A. Bandettini, *Estimating temporal characteristics of neuronal activity in the visual cortex from BOLD-fMRI*, Human Brain Mapping, Sendai, 2002.

22. R.M. Birn, Z.S. Saad, P.A. Bandettini, *Optimum Stimulus Timing for Estimating fMRI Response Latencies*, ISMRM 11th Scientific Meeting, Toronto, 2003.

23. K.E. Bove Bettis, J.A. Bodurka, R.M. Birn, P. Rowser, Z.S. Saad, R.W. Cox, P.A. Bandettini, *Appearance of Calcification Artifact in the Falx Cerebri on Phase Maps Using a High Resolution Venogram Technique at 3 Tesla*, ISMRM 11th Scientific Meeting, Toronto, 2003.

24. K.E. Bove Bettis, J.A. Bodurka, R.M. Birn, P. Rowser, Z.S. Saad, R.W. Cox, P.A. Bandettini, *Demonstration of Cerebral Venous Vasculature Using a High Resolution Venogram Technique at 3 Tesla*, ISMRM 11th Scientific Meeting, Toronto, 2003.

25. R.M. Birn, P.A. Bandettini, *Voxel-wise determination of relative intra- and extra-vascular contributions to the fMRI BOLD signal*, Human Brain Mapping, New York, 2003.

26. W.M. Luh, R.M. Birn, P.A. Bandettini, *Proton-Density Increase Measured by Gradient-Echo and Spin-Echo TE-Stepping EPI During Functional Motor Activation*, Human Brain Mapping, New York, 2003.

27. A.S. Tuan, R.M. Birn, G.M. Boynton, P.A. Bandettini, *Non-linear Response in Ramped Onset Stimuli in V1*, Human Brain Mapping, New York, 2003.

28. R.M. Birn, K.E. Bove-Bettis, P.A. Bandettini, *A voxel-wise comparison of global BOLD changes during breath-hold with CBV maps derived from bolus-injected Gd-DTPA*, ISMRM 12th Scientific Meeting, Kyoto, Japan, 2004.

29. R.M. Birn, K.E. Bove-Bettis, P.A. Bandettini, *Vessel Size Mapping in Human Brain using a Bolus Injection of Gd-DTPA and Combined GE and SE EPI*, ISMRM 12th Scientific Meeting, Kyoto, Japan, 2004.

30. R.M. Birn, K.E. Bove-Bettis, P.A. Bandettini, *Bolus Gd-DTPA washout dynamics predict BOLD dynamics*, ISMRM 12th Scientific Meeting, Kyoto, Japan, 2004.

31. R.M. Birn, J.A. Bodurka, N. Petridou, P.A. Bandettini, *Experimental determination of the effect of T2' changes in spin-echo EPI*, ISMRM 12th Scientific Meeting, Kyoto, Japan, 2004.

32. R.M. Birn, K.E. Bove-Bettis, P.A. Bandettini, *Calibrating BOLD fMRI Response Latencies Using Gd-DTPA Bolus Washout Dynamics*, Organization of Human Brain Mapping Meeting, Budapest, Hungary, 2004.

33. R.M. Birn, M.S. Smith, P.A. Bandettini, *Mapping and Correcting the Effects of Respiratory Variations in fMRI*, Organization of Human Brain Mapping , Toronto, Canada, 2005.

34. J. Diamond, R.M. Birn, P.A. Bandettini, Low frequency respiration *fluctuations co-localize with 'default-mode' network*, Organization of Human Brain Mapping , Toronto, Canada, 2005.

Other Presentations:

1. Dyphagia Institute Research Seminar. *Basic Principles of Magnetic Resonance Imaging.* Dysphagia Institute, Medical College of Wisconsin, Milwaukee, Wisconsin.
   July, 1995.
2. Marquette Biomedical Engineering Student Research Presentations. *Correction of dynamic Bz-field artifacts in echo-planar MRI*. Marquette University, Milwaukee, Wisconsin.
   April, 1997.

3. Gastroenterology Research Presentation. *Improved technique for the study of brain activity during swallowing by fMRI.* Medical College of Wisconsin, Milwaukee, Wisconsin.
   February, 1999
4. Human Brain Mapping Educational Program. *Dealing with Motion and Susceptibility in fMRI.* San Antonio, Texas.
   June 2000
5. Human Brain Mapping Educational Program. *FMRI Methods - Event Related vs. Blocked Design.*, Brighton, UK.
   June 2001
6. Functional MRI: an introductory course. *The Basics of fMRI* Medical College of Wisconsin, Milwaukee, Wisconsin.
   October 2001
7. Functional MRI: an introductory course. *Event-Related fMRI*. Medical College of Wisconsin, Milwaukee, Wisconsin.
   Oct. 2000, May 2001, Oct. 2001, May 2002, Oct. 2002, May 2003, Oct. 2003.
8. University of Heidelberg, *New applications in high-field fMRI*, Heidelberg, Germany.
   July 2003